SEQUENCE LISTING

<110> NUTALL, PATRICIA
OXFORD VACS LTD
PARSON, GUIDO CHRISTIAN

<120> HISTAMINE AND SEROTONIN BINDING MOLECULES

<130> Oxford Vacs - Histamine and Serotonin

<140> US 09/555 296
<141> 2000-09-13

<160> 31

<170> PatentIn Ver. 2.1

<210> 1
<211> 190
<212> PRT
<213> Rhipicephalus appendiculatus

<400> 1
Met Lys Leu Leu Leu Ser Leu Ala Phe Val Leu Ala Leu Ser Gln Val
1 5 10 15

Lys Ala Asp Lys Pro Val Trp Ala Asp Glu Ala Ala Asn Gly Glu His
20 25 30

Gln Asp Ala Trp Lys His Leu Gln Lys Leu Val Glu Glu Asn Tyr Asp
35 40 45

Leu Ile Lys Ala Thr Tyr Lys Asn Asp Pro Val Trp Gly Asn Asp Phe
50 55 60

Thr Cys Val Gly Thr Ala Ala Gln Asn Leu Asn Glu Asp Glu Lys Asn
65 70 75 80

Val Glu Ala Trp Phe Met Phe Met Asn Asn Ala Asp Thr Val Tyr Gln
85 90 95

His Thr Phe Glu Lys Ala Thr Pro Asp Lys Met Tyr Gly Tyr Asn Lys
100 105 110

Glu Asn Ala Leu Thr Tyr Gln Thr Glu Asp Gly Gln Val Leu Thr Asp
115 120 125

Val Leu Ala Phe Ser Asp Asp Asn Cys Tyr Val Ile Tyr Ala Leu Gly
130 135 140

Pro Asp Gly Ser Gly Ala Gly Tyr Glu Leu Trp Ala Thr Asp Tyr Thr
145 150 155 160

Asp Val Pro Ala Ser Cys Leu Glu Lys Phe Asn Glu Tyr Ala Ala Gly
165 170 175

Leu Pro Val Pro Asp Val Tyr Thr Ser Asp Cys Leu Pro Glu
180 185 190

<210> 2
<211> 190
<212> PRT
<213> Rhipicephalus appendiculatus

<400> 2
Met Lys Leu Leu Ile Leu Ser Leu Ala Leu Val Leu Ala Leu Ser Gln
1 5 10 15

Val Lys Gly Asn Gln Pro Asp Trp Ala Asp Glu Ala Ala Asn Gly Ala
20 25 30

His Gln Asp Ala Trp Lys Ser Leu Lys Ala Asp Val Glu Asn Val Tyr
35 40 45

Tyr Met Val Lys Ala Thr Tyr Lys Asn Asp Pro Val Trp Gly Asn Asp
50 55 60

Phe Thr Cys Val Gly Val Met Ala Asn Asp Val Asn Glu Asp Glu Lys
65 70 75 80

Ser Ile Gln Ala Glu Phe Leu Phe Met Asn Asn Ala Asp Thr Asn Met
85 90 95

Gln Phe Ala Thr Glu Lys Val Thr Ala Val Lys Met Tyr Gly Tyr Asn
100 105 110

Arg Glu Asn Ala Phe Arg Tyr Glu Thr Glu Asp Gly Gln Val Phe Thr
115 120 125

Asp Val Ile Ala Tyr Ser Asp Asp Asn Cys Asp Val Ile Tyr Val Pro
130 135 140

Gly Thr Asp Gly Asn Glu Glu Cys Tyr Glu Leu Trp Thr Thr Asp Tyr
145 150 155 160

Asp Asn Ile Pro Ala Asn Cys Leu Asn Lys Phe Asn Glu Tyr Ala Val
165 170 175

Gly Arg Glu Thr Arg Asp Val Phe Thr Ser Ala Cys Leu Glu
180 185 190

<210> 3
<211> 200
<212> PRT
<213> Rhipicephalus appendiculatus

<400> 3
Met Lys Val Leu Leu Leu Val Leu Gly Ala Ala Leu Cys Gln Asn Ala
1 5 10 15

Asp Ala Asn Pro Thr Trp Ala Asn Glu Ala Lys Leu Gly Ser Tyr Gln

```
            20                  25                  30

Asp Ala Trp Lys Ser Leu Gln Gln Asp Gln Asn Lys Arg Tyr Tyr Leu
        35                  40                  45

Ala Gln Ala Thr Gln Thr Thr Asp Gly Val Trp Gly Glu Glu Phe Thr
    50                  55                  60

Cys Val Ser Val Thr Ala Glu Lys Ile Gly Lys Lys Lys Leu Asn Ala
65                  70                  75                  80

Thr Ile Leu Tyr Lys Asn Lys His Leu Thr Asp Leu Lys Glu Ser His
                85                  90                  95

Glu Thr Ile Thr Val Trp Lys Ala Tyr Asp Tyr Thr Thr Glu Asn Gly
            100                 105                 110

Ile Lys Tyr Glu Thr Gln Gly Thr Arg Thr Gln Thr Phe Glu Asp Val
        115                 120                 125

Phe Val Phe Ser Asp Tyr Lys Asn Cys Asp Val Ile Phe Val Pro Lys
    130                 135                 140

Glu Arg Gly Ser Asp Glu Gly Asp Tyr Glu Leu Trp Val Ser Glu Asp
145                 150                 155                 160

Lys Ile Asp Lys Ile Pro Asp Cys Cys Lys Phe Thr Met Ala Tyr Phe
                165                 170                 175

Ala Gln Gln Gln Glu Lys Thr Val Arg Asn Val Tyr Thr Asp Ser Ser
            180                 185                 190

Cys Lys Pro Ala Pro Ala Gln Asn
        195                 200
```

<210> 4
<211> 209
<212> PRT
<213> Rhipicephalus appendiculatus

<400> 4

```
Met Lys Met Gln Val Val Leu Leu Leu Thr Phe Val Ser Ala Ala Leu
  1               5                  10                  15

Ala Thr Gln Ala Glu Thr Thr Ser Ala Lys Ala Gly Glu Asn Pro Leu
            20                  25                  30

Trp Ala His Glu Glu Leu Leu Gly Lys Tyr Gln Asp Ala Trp Lys Ser
        35                  40                  45

Ile Asp Gln Gly Val Ser Val Thr Tyr Val Leu Ala Lys Thr Thr Tyr
    50                  55                  60

Glu Asn Asp Thr Gly Ser Trp Gly Ser Gln Phe Lys Cys Leu Gln Val
65                  70                  75                  80
```

```
Gln Glu Ile Glu Arg Lys Glu Glu Asp Tyr Thr Val Thr Ser Val Phe
                85                  90                  95

Thr Phe Arg Asn Ala Ser Ser Pro Ile Lys Tyr Tyr Asn Val Thr Glu
            100                 105                 110

Thr Val Lys Ala Val Phe Gln Tyr Gly Tyr Lys Asn Ile Arg Asn Ala
        115                 120                 125

Ile Glu Tyr Gln Val Gly Gly Gly Leu Asn Ile Thr Asp Thr Leu Ile
    130                 135                 140

Phe Thr Asp Gly Glu Leu Cys Asp Val Phe Tyr Val Pro Asn Ala Asp
145                 150                 155                 160

Gln Gly Cys Glu Leu Trp Val Lys Lys Ser His Tyr Lys His Val Pro
                165                 170                 175

Asp Tyr Cys Thr Phe Val Phe Asn Val Phe Cys Ala Lys Asp Arg Lys
            180                 185                 190

Thr Tyr Asp Ile Phe Asn Glu Glu Cys Val Tyr Asn Gly Glu Pro Trp
        195                 200                 205

Leu
```

<210> 5
<211> 207
<212> PRT
<213> Rhipicephalus appendiculatus

<400> 5

```
Met Phe Leu Ala Gly Phe Phe Ile Phe Gly Ala Ala Val Leu Ser Val
  1               5                  10                  15

Leu Ala Glu Glu Thr Pro Asn Asp Arg Cys Thr Thr His Thr Pro Asn
            20                  25                  30

Gly Trp Gln Phe Leu Lys Lys Gly Lys Arg Tyr Asp Met Lys Gln Arg
        35                  40                  45

Thr Phe Gln Thr Pro Asn Ser Asp Asp Thr Lys Cys Leu Ser Ser Thr
    50                  55                  60

Ile Asp Gly Lys Asn Glu Asn Asn His Thr Val Gln Ala Thr Ile Arg
65                  70                  75                  80

Tyr Arg Asn Gly Tyr Glu Gly Lys Trp Asp Thr Ile Arg Gln Glu Tyr
                85                  90                  95

Glu Phe Pro Asn Tyr Thr Ala Gly Asp Tyr Asn Ser Met Lys Thr Thr
            100                 105                 110

Asp Lys Ser Pro Pro Pro Pro Ala Ser Tyr Leu Phe Gly Tyr Thr Gly
        115                 120                 125
```

Ser Ser Cys Ala Val Val Tyr Val Asn Ser Ile Gly Pro Val Arg Ser
130 135 140

Asn Ser Glu Asn Pro Pro Glu Arg Leu Thr Ala Ser Gln Glu Ser Ala
145 150 155 160

Gln Arg Asp Cys Val Leu Trp Val Asp His Asp Glu Lys Ala Thr Gln
165 170 175

Glu Gln Cys Cys Glu Asp Phe Phe Lys Thr His Cys Lys Glu Thr Val
180 185 190

His Val Ile Tyr Asp Val Asn Arg Cys Lys Glu Asn Gly Ser Glu
195 200 205

<210> 6
<211> 198
<212> PRT
<213> Boophilus microplus

<400> 6
Met Asn Ser Ala Leu Trp Val Leu Leu Gly Ser Ser Leu Trp Leu His
1 5 10 15

Thr Val Ala Phe Met Ile Pro Thr Trp Ala Asp Glu Gly Arg Phe Gly
20 25 30

Lys Tyr Gln Asn Ala Trp Lys Ala Leu Asn Gln Arg Ile Asn Thr Thr
35 40 45

His Val Leu Val Arg Ser Thr Tyr Ile Asp Asn Pro Tyr Leu Trp Gly
50 55 60

Lys Asn Phe Ser Cys Val Arg Ala Arg Thr Val Glu Val Phe Pro Ser
65 70 75 80

Ser Lys Thr Val Glu Leu Glu Phe Ser Phe Arg Asn Arg Thr Gly Ile
85 90 95

Leu Cys Met Arg Asn Gln Thr Val Arg Ala Gly Lys Asp Tyr Phe Tyr
100 105 110

His Gln Pro Asn Ala Phe Glu Phe Met Leu Arg Gly Asn Arg Ser Phe
115 120 125

Ser Asn Ala Val Met Phe Thr Asp Gly Met Thr Cys Asn Leu Leu Ser
130 135 140

Phe Pro Tyr Gln Arg Asn Lys Pro Gln Cys Glu Leu Trp Val Lys Asp
145 150 155 160

Thr Arg Val Asp Asn Ile Pro Pro Cys Cys Ser Phe Met Phe Asp Tyr
165 170 175

Leu Cys Pro Gln Pro Arg Pro Phe Ile Ile Tyr Asp Lys Ala Met Cys
180 185 190

Thr Val Arg Pro Pro Arg
195

<210> 7
<211> 203
<212> PRT
<213> Boophilus microplus

<400> 7
Met Lys Ala Leu Leu Ile Ala Val Gly Tyr Leu Ala Ala Val Thr Ala
1 5 10 15

Ala Pro Gln Ala Ser Pro Ser Ser Pro Arg Asn Glu Pro Leu Lys Asn
20 25 30

Thr Thr Trp His Ser Lys Glu Leu Lys Asn Tyr Gln Asp Ala Trp Lys
35 40 45

Ser Ile Asn Gln Asn Val Ser Thr Thr Tyr Tyr Phe Leu Arg Ser Thr
50 55 60

Tyr Asn Asn Asp Ser Val Trp Gly Lys Asn Phe Thr Cys Leu Ser Val
65 70 75 80

Thr Val Thr Ser Lys His Glu Ser Thr Phe Thr Val Glu Tyr Asn Thr
85 90 95

Thr Tyr Lys Asn Gln Ser Gln Gln Trp Val Ser Met Thr Glu Asn Val
100 105 110

Thr Ala Val Gln Glu Glu Gly Tyr Asp Val Lys Asn Ile Ile Gln Trp
115 120 125

Thr Thr Glu Asn Asn Thr Lys Phe Asn Asp Thr Val Val Phe Thr Asp
130 135 140

Gly Gln Thr Cys Asp Leu Leu Tyr Ile Pro Tyr Lys Glu Asn Gly Tyr
145 150 155 160

Glu Leu Trp Val Arg Ser Asp Tyr Leu Gln Asn Thr Pro Thr Cys Cys
165 170 175

Gln Phe Ile Phe Asp Leu Val Ala Leu Gly Arg Thr Thr Tyr Asn Ile
180 185 190

Ser Thr Pro Asp Cys Val Thr Lys Thr Ser Arg
195 200

<210> 8
<211> 203
<212> PRT

<213> Boophilus microplus

<400> 8

```
Met Lys Ala Leu Leu Ile Ala Val Val Tyr Leu Thr Ala Val Thr Ala
  1               5                  10                  15

Ala Asp Gln Ala Pro Pro Ser Ser Thr Arg Asn Glu Pro Leu Glu Lys
             20                  25                  30

Thr Thr Trp His Asn Gln Thr Leu Gly Arg Tyr Gln Asp Ala Trp Lys
         35                  40                  45

Ser Ile Asn Gln Ser Val Gly Thr Thr Tyr Tyr Phe Leu Arg Ser Thr
     50                  55                  60

Tyr Asn Asn Asp Ser Val Trp Gly Lys Asn Phe Thr Cys Leu Ser Val
 65                  70                  75                  80

Thr Val Thr Ser Lys Tyr Glu Ser Thr Phe Thr Val Glu Tyr Asn Thr
                 85                  90                  95

Thr Tyr Lys Asn Gln Ser Gln Gln Trp Val Ser Met Ser Glu Asn Val
            100                 105                 110

Thr Ala Val Gln Glu Gly Gly Tyr Ser Val Lys Asn Ile Ile Gln Trp
        115                 120                 125

Thr Thr Glu Asn Asn Thr Lys Phe Asn Asp Thr Val Val Phe Thr Asp
    130                 135                 140

Gly Gln Thr Cys Asp Val Leu Tyr Ile Pro Tyr Lys Glu Asp Gly Tyr
145                 150                 155                 160

Glu Leu Trp Val Arg Ser Glu Tyr Leu Gln Asn Thr Pro Thr Cys Cys
                165                 170                 175

Gln Phe Ile Phe Asp Leu Val Ala Leu Gly Arg Thr Thr Tyr Asn Ile
            180                 185                 190

Ser Thr Pro Asn Cys Val Ala Thr Thr Ala Gly
        195                 200
```

<210> 9
<211> 285
<212> PRT
<213> Boophilus microplus

<400> 9

```
Met Ala Leu Arg Phe Ala Leu Leu Leu Ala Cys Ile Val Thr Ala Cys
  1               5                  10                  15

Gly Trp Arg Thr Arg Ile Gln Glu Lys Gly Pro Glu Asn Asn Pro Leu
             20                  25                  30

Met Asn Thr Gln Arg Leu Gly Lys Met Gln Asp Ala Trp Lys Ser Leu
         35                  40                  45
```

```
Glu Lys Ala Thr Asn Gln Ser Tyr Val Leu Val Phe Arg Ser Arg Asn
     50                  55                  60

His Glu Pro Glu Ile Ser Cys Val Tyr Val Arg Ala Ser Asn Ile Asn
 65                  70                  75                  80

Asn Asp Thr Lys Thr Ala Thr Tyr Thr Arg Thr Tyr Tyr Asn Met Thr
                 85                  90                  95

Ala Asn Ala Thr Met Thr Val Asn Tyr Thr Ala Arg Ala Leu Lys Gln
            100                 105                 110

Val Asp Tyr Glu Ser Glu Asn Val Val Arg Val Asn Leu Thr Gly Gly
        115                 120                 125

Val Pro Ser Asn Asp Thr Val Pro Leu Gly Ser Tyr Glu Tyr Val Glu
    130                 135                 140

Tyr Gly Asn Tyr Ser Cys Asn Ser Ser Ser Thr Pro Phe Leu Asp Ala
145                 150                 155                 160

Val Gln Met Ala Ser Gln Gly Gln Ser Arg Gly Pro Asp Ile Glu Gly
                165                 170                 175

Arg Thr Tyr Leu Asp Phe Tyr Val Val Tyr Asn Gln Pro Ser Cys Asn
            180                 185                 190

Val Leu Lys Ser Pro Leu Leu Gly Gly Ala Cys Asp Phe Trp Val Thr
        195                 200                 205

Glu Ser Glu Leu Gln Lys Ala Leu Asn Lys Thr Ser Glu Lys Lys Lys
    210                 215                 220

Thr Lys Leu Glu Ala Arg Ala Arg Lys Ala Gly Gly Asp Ser Asp Asp
225                 230                 235                 240

Gln Gly Pro Glu Leu Glu Val Val Phe Lys Asn Leu Pro Pro Pro Cys
                245                 250                 255

Arg Ala Ala Phe Ile Thr Ser Cys Gly Tyr Pro Thr Phe Leu Met Tyr
            260                 265                 270

Asn Lys Thr Ile Cys Asn Arg Thr Asp Ser Ala Ala Val
        275                 280                 285


<210> 10
<211> 284
<212> PRT
<213> Boophilus microplus

<400> 10
Met Ala Leu Arg Phe Ala Leu Leu Leu Ala Cys Ile Val Thr Ala Cys
  1               5                  10                  15

Gly Trp Arg Thr Arg Ile Gln Glu Lys Gly Pro Glu Asn Asn Pro Leu
```

```
                20                  25                  30

Met Asn Thr Gln Arg Leu Gly Lys Met Gln Asp Ala Trp Lys Ser Leu
          35                  40                  45

Glu Lys Ala Ala Asn Gln Thr Tyr Val Leu Val Phe Arg Ser Arg Asn
     50                  55                  60

His Glu Pro Asp Ile Ser Cys Val Tyr Val Arg Ala Ser Asn Leu Asp
 65                  70                  75                  80

Asn Ala Thr Lys Thr Ala Asp Tyr Thr Arg Thr Tyr Tyr Asn Met Thr
                 85                  90                  95

Ala Lys Gln Asn Val Ser Val Asn Tyr Thr Ala Arg Ala Leu Lys Gln
            100                 105                 110

Val Asp Tyr Glu Ser Glu Asn Val Val Arg Val Asn Leu Thr Gly Gly
        115                 120                 125

Val Pro Ser Asn Asp Thr Val Pro Pro Gly Ser Phe Glu Tyr Val Glu
    130                 135                 140

Tyr Gly Asn Tyr Ser Cys Asn Ser Ser Ser Thr Pro Phe Leu Asp Ala
145                 150                 155                 160

Val Gln Met Ala Ser Gln Gly Gln Ser Trp Gly Pro Asp Val Glu Gly
                165                 170                 175

Arg Thr Tyr Leu Asp Phe Tyr Val Val Tyr Asn Gln Pro Ser Cys Asn
            180                 185                 190

Val Leu Lys Ser Pro Leu Leu Gly Gly Ala Cys Asp Phe Trp Val Pro
        195                 200                 205

Gln Ser Glu Leu Asp Lys Val Leu Asn Lys Lys Gly Asp Lys Lys Lys
    210                 215                 220

Pro Ala Lys Ser Ser Ser Gln Asn Gly Asp Glu Gly Ser Asp Ala Glu
225                 230                 235                 240

Gln Pro Glu Leu Glu Ala Ile Phe Lys His Leu Pro Pro Pro Cys Arg
                245                 250                 255

Ala Ala Phe Ile Thr Ser Cys Gly Tyr Pro Asn Phe Leu Met Tyr Asn
            260                 265                 270

Lys Thr Ile Cys Asn Ala Ala Gly His Ala Ala Asn
        275                 280
```

<210> 11
<211> 321
<212> PRT
<213> Boophilus microplus

<400> 11

```
Met Asp Ile Arg Ser Ala Val Leu Phe Ala Cys Ile Val Ser Ala Cys
 1               5                  10                  15

Cys Gly Phe Trp Arg Trp Thr Thr Arg Arg Val Thr Lys Lys Pro Asp
            20                  25                  30

Asn Ser Pro Leu Leu Asn Asn Gln His Leu Gly Leu Phe Gln Asp Ala
        35                  40                  45

Trp Lys Thr Ile Glu Glu Thr Ser Asn Asp Thr Tyr Val Leu Met Phe
    50                  55                  60

Arg Ser Lys His Tyr Asp His Glu Asn Lys Ala Lys Cys Val Phe Val
65                  70                  75                  80

Thr Ala Asn Ile Thr Asp Ser Arg Asn Lys Thr Ala Asn Tyr Thr Ile
                85                  90                  95

Thr Tyr Tyr Asp Thr Thr Thr Asn Thr Ser Asn Asn Phe Thr Ile Pro
            100                 105                 110

Val Arg Ala Leu Asn Gln Thr Asp Tyr Ser Leu Glu Asn Val Ile Arg
        115                 120                 125

Ala Ser Phe Asn Gly Asp Thr Pro Ser Ser Thr Pro Ala Pro Pro Gly
    130                 135                 140

Ser Ser Val Tyr Ile Gln Tyr Asn Asn Val Thr Cys Tyr Ala Gln Tyr
145                 150                 155                 160

His Pro Phe Ser Asn Asn Gly Ile Ser Ala Lys Tyr Asp Glu Met Pro
                165                 170                 175

Arg Asp Gly Arg Asn Tyr Leu Phe Asp Asn Phe Ile Gly Ala Tyr Leu
            180                 185                 190

Asp Phe Tyr Val Val Phe Ser Gln Pro Thr Cys Asn Val Leu Arg Val
        195                 200                 205

Arg Glu Gly Cys Asp Phe Trp Leu Arg Lys Thr Glu Leu Pro Ser Leu
    210                 215                 220

Leu Lys Ala Ala Glu Asn Asp Asp Asn Asp Asn Thr Glu Ser Leu Lys
225                 230                 235                 240

Asn Tyr Trp Glu Arg Arg Ile Asn Asn Thr Lys Thr Arg Phe Arg His
                245                 250                 255

Asn Thr Lys Lys Cys Lys Met Tyr Val Gln Arg Tyr Ser Ile Glu Lys
            260                 265                 270

Ala Glu Asp Val Phe Lys Asn Thr Ala Phe Lys His Leu Pro Ser Asp
        275                 280                 285

Cys Arg Phe Ala Phe Leu Ala Ala Cys Gly Asn Pro Ala Phe Thr Ile
    290                 295                 300
```

Tyr Asp Pro Glu Thr Cys Asn Ser Ser Leu Pro Ala Asn Met Ala Glu
305 310 315 320

Ser

<210> 12
<211> 770
<212> DNA
<213> Rhipicephalus appendiculatus

<400> 12
agaaagccaa catgaagctt ctgctctctc ttgccttcgt cttagctctc agccaagtta 60
aagccgataa gccagtttgg gcggatgaag cggcaaacgg ggaacaccaa gacgcctgga 120
agcatctcca aaaactcgtt gaagagaatt acgacttgat aaaagccacc tacaagaacg 180
acccagtttg gggtaacgac ttcacttgcg tgggtactgc agcgcagaat ttgaacgagg 240
acgagaagaa cgttgaagca tggtttatgt ttatgaataa tgctgatacc gtataccaac 300
atacttttga aaaggcgact cctgataaaa tgtacggtta caataaggaa aacgccatca 360
catatcaaac agaggatggg caacttctca cagacgtcct tgcattctct gacgacaatt 420
gctatgtcat ctacgctctt ggcccagatg gaagtggagc aggttacgaa ctctgggcta 480
ccgattacac ggatgttcca gccagttgtc tagagaagtt caatgagtat gctgcaggtc 540
tgccggtacg ggacgtatac acaagtgatt gcctcccaga ataacttggg catatcgtaa 600
tttcaacttc aaagtgtgtt attgtcagca tatgtctcga gtgtttgatg tagtgcgttc 660
gatgatgcca ttcatctagg tttcgggtgt tcggtacttt atgctcactg ccgacggcca 720
gcacgagtac tcgaaaataa agtattctga aatcggaaaa aaaaaaaaaa 770

<210> 13
<211> 793
<212> DNA
<213> Rhipicephalus appendiculatus

<400> 13
gccgcgacgg aacttcgaag gaagtcagca tgaagcttct catactctct cttgccctcg 60
tcctcgccct cagccaggtt aagggaaatc agccagattg ggccgatgaa gcggcaaatg 120
gtgcacacca agacgcctgg aagagtctga aagcggacgt tgaaaacgtt tactacatgg 180
tgaaggccac ctataagaat gacccagtgt ggggcaatga cttcacttgc gtgggtgtta 240
tggcaaatga tgtcaacgag gatgagaaga gcattcaagc agagtttttg tttatgaata 300
atgctgacac aaacatgcaa ttcgccactg aaaaggtgac tgctgttaaa atgtatggtt 360
acaataggga aaacgccttc agatacgaga cggaggatgg ccaagttttc acagacgtca 420
ttgcatactc tgatgacaac tgcgatgtca tctacgttcc tggcacagac ggaaatgagg 480
aaggttacga actatggact acggattacg acaacattcc agccaattct ttaaataagt 540
ttaatgagta cgctgtaggt agggagacaa gggatgtatt cacaactgct tgcctagagt 600
aataacttca gaatgtcgtt ctttcaaagc gaaaaaccaa caatgtgaac atcggcttgc 660
tgtgctcgac gtagccagcg ataatgttgt tttcctgggt ttctgggttt ggatactttt 720
agccactgcc gaagagctgt aaaggtaatg aaaaataaaa tgttcaagag tgtgaaaaaa 780
aaaaaaaaaa aaa 793

<210> 14
<211> 753
<212> DNA
<213> Rhipicephalus appendiculatus

<400> 14
aaagcactca acatgaaggt tcttttgttg gttcttggag ctgctctttg ccagaatgca 60
gatgcaaacc caacatgggc gaacgaagct aaattgggat cctaccaaga cgcctggaag 120

agccttcagc aagaccaaaa caagagatac tatttggcac aagcgacaca aacgactgac 180
ggcgtatggg gtgaagagtt tacttgtgtg agtgttacgg ctgagaagat tggaaagaaa 240
aaacttaacg ctacgatcct ctataaaaat aagcacctta ctgacctgaa agagagtcat 300
gaaacaatca ctgtctggaa agcatacgac tacacaacgg agaatggcat caagtacgag 360
acgcaaggga caaggacgca gactttcgaa gatgtctttg tattctctga ttacaagaac 420
tgcgatgtaa ttttcgttcc caaagagaga ggaagcgacg agggcgacta tgaattgtgg 480
gttagtgaag acaagattga caagattccc gattgctgca agtttacgat ggcgtacttt 540
gcccaacagc aggagaagac ggttcgtaat gtatacactg actcatcatg caaaccagca 600
ccagctcaga actgatattc tggtaatgct tgaaccgtaa tggttcgacc tgcagtctag 660
aaacatttac caccatcacg gtgattatct taccgtagtt tcttaggtct tgttctttga 720
ataaaatagt tccctgcatt gacaaaaaaa aaa 753

<210> 15
<211> 719
<212> DNA
<213> Rhipicephalus appendiculatus

<400> 15
atgaagatgc aggtagtgct cttacttacc tttgttagcg ccgccctcgc cactcaagcg 60
gagactacat ctgcgaaagc aggagaaaac ccgctctggg cgcatgagga actacttgga 120
aaatatcaag atgcctggaa aagcatcgat cagggcgtgt cggtgactta tgtccttgca 180
aagacaacat atgagaatga cacaggatca tggggatccc agtttaagtg cctccaggta 240
caagaaatag aaagaaagga agaagactat acagttacat ctgttttcac ctttagaaat 300
gcgtcttctc caatcaagta ttacaacgtg acagaaacag tgaaggccgt ttttcaatat 360
ggatacaaaa acataaggaa tgcaattgaa taccaagtgg gcggtggact taacataacc 420
gacacgctca ttttcactga tggagaatta tgcgatgttt tctatgttcc caatgcagat 480
caaggttgtg agctctgggt caaaaagagt cactacaaac acgtaccaga ctactgcacg 540
ttcgtgttca atgttttctg tgcgaaagac aggaaaacct acgatatatt taatgaagaa 600
tgtgtttata acggcgaacc ctggctttaa aggcaaaaaa tctataaaat acggtttctg 660
tagtaagtac taatagcaag tagttgaata ataaaaagat tgtaagtgca aaaaaaaaa 719

<210> 16
<211> 832
<212> DNA
<213> Rhipicephalus appendiculatus

<400> 16
caactgatca ctaaaatgtt ccttgcgggt ttcttcattt tcggcgctgc cgtcctctca 60
gttttggctg aggagacacc taatgataga tgtactacac acactcctaa tggatggcag 120
tttctcaaga aaggcaagag atacgatatg aaacagagaa ccttccaaac acctaactca 180
gacgacacta aatgcctgtc cagtactatc gacggaaaga atgaaaataa ccatacagta 240
caagcaacga taagatatcg aaatggttat gaaggaaaat gggacaccat ccgccaggag 300
tacgagttcc ccaactacac tgcaggagac tacaactcca tgaagacaac agacaaatcc 360
ccgcctccgc cggcatcata cctgtttgga tatactggaa gctcttgtgc cgtggtgtac 420
gtgaattcca ttggacctgt tcgtagcaat tctgaaaacc caccagaaag actcacagca 480
agtcaggaaa gtgcacaacg cgattgcgtc ctttgggtcg atcacgatga aaaagctacc 540
caagaacaat gctgtgaaga tttcttcaag acccactgca aagagactgt ccatgtcata 600
tacgacgtga atagatgcaa ggagaatggc agtgaataac acgatgccgg gaatggcatg 660
gcgacttcat ttatgaagga agacttccac agatgtgaaa cttgccttca ttttgcttgt 720
tactttagac caacatattc ttccttttcc gacttcaatg atatgatcta ggttgtaaaa 780
agagcgtttt aataaagaaa gtattagcat cgatgatgga aatataaaaa aa 832

<210> 17
<211> 1488

<212> DNA
<213> Amblyomma variegatum

<400> 17
gcgaccgcgc ccagccgtac agaacaaata gccttcgttg caaacgtgca gcgtagtcgg 60
atgcctagtt aaacaccaca cacacgtaaa aagtagacga aactggcttc gcttccagca 120
ccaagcaggt catcgtctgg tccactgacg atgaactctg ccttgtgggt tttactagga 180
tcatccttat ggctgcatac ggtagcgttc atgattccca catgggcaga tgaaggcagg 240
tttggcaagt accagaacgc ctggaaggcc ctgaatcagc ggattaacac aacacatgtc 300
cttgtgaggt caacgtatat cgacaatcca tatttatggg gcaagaactt ctcatgcgta 360
cgcgctcgaa ctgtcgaagt ctttcccagc agcaagactg tggaactgga gtttagtttc 420
agaaacagga ctggtatatt gtgcatgaga aatcaaacgg ttcgagctgg aaaggattac 480
ttttatcatc agcctaacgc cttcgaattc atgctgagag gtaacaggtc gttttctaac 540
gctgtcatgt ttaccgacgg aatgacatgt aatctgctca gctttccata ccagcgcaac 600
aaaccacaat gcgaactatg ggtgaaggac acgcgcgtcg acaacattcc cccttgttgc 660
tcgttcatgt tcgactattt gtgcccacag cctcgtccat tcatcattta cgacaaagca 720
atgtgcacgg tgaggccacc ccgctagaaa gaaaagggat gaaaaggcta ctcgaagaag 780
caacaaccaa tcagtgccca caagagaacc gttccagtcc tgcgaaagtt gcgcctccca 840
aaacacatac atttcactgc aaagatgacc gatgcagtcg caaattcgtg tcctagaact 900
caagtgctgt tttggaaact cggaaaggag acagtagaag ctaactgctg tgatacctag 960
gccaggcatt tccgtcgggc actgtttttt atgaataggg tagggtgaaa gtattttggc 1020
tttgctgtgg cccaataaat agcgtatatt agcggactag catcgaagtt ccagatgcta 1080
taaagcagct aaaactcact tctgcctgga acttcgatag gtattgaata gatcatgcgc 1140
gcacagaaaa gaaaagtatc aatcaaaaca taaaaagcat tcttcgcatg tgcgcaaagc 1200
attccctaag tccacgctaa aaataggtgt catttcatat agcatcgagt tctatacgtt 1260
cttaagatgc taccggtcat tcattccttt ctcgtctatg cctcatggat ctgaaccaag 1320
ttcttctatt gcctccttgt tttccggtag ctacagagtt cagcagcacc attgctagtg 1380
catattttat cttcgtgctg tgtttgtcgc agtatatttt tctgcctatt cacgatattt 1440
gcacaatgta ataaaacatt tgcctgccta aaaaaaaaaa aaaaaaaa 1488

<210> 18
<211> 760
<212> DNA
<213> Boophilus microplus

<400> 18
ctccagctct gcttcgacga tgaaggctct cctgatcgct gtcggctacc tggctgccgt 60
cacagcggca ccccaagctt cgccttcctc tccgaggaac gaaccactca agaatactac 120
gtggcacagc aaggaactga aaaattatca agatgcgtgg aagtccatca atcaaaacgt 180
cagcactacc tactacttcc tcagatcaac ctacaacaac gacagtgtct ggggtaaaaa 240
tttcacctgt cttagcgtca cggtgacatc gaaacatgaa tcaacgttca ccgtcgaata 300
taacaccacg tacaaaaatc agagccaaca atgggtcagc atgacggaaa acgtcacggc 360
cgtgcaggag gagggctacg acgttaaaaa tatcattcag tggacaacag agaataacac 420
aaagttcaat gatactgttg tttttacgga cggccagact tgtgatctgt tgtacatccc 480
gtacaaagaa aacggttacg agctgtgggt gcgttcggat tacctgcaga acactccaac 540
gtgctgccag ttcatctttg acctcgtcgc attgggacgt accacgtaca atatctccac 600
tcctgactgc gtgaccaaaa cctctcgtta gaccgtgaaa gccgcggctt atgctactcg 660
actgctcagg ttggaagagt agggagcccc gacgcgcact actactaaaa atgattccaa 720
ataaagtatt caaacatttc aaaaaaaaaa aaaaaaaaaa 760

<210> 19
<211> 765
<212> DNA
<213> Boophilus microplus

<400> 19
agtgactcct gctctgcttc gacgatgaag gctctcctga tcgctgtcgt ctacctgact 60

gccgtcacag cggcagacca agctccgcct tcctctacga ggaatgaacc actcgagaaa 120
actacctggc acaaccagac actgggacgt tatcaagatg cgtggaagtc catcaatcaa 180
agcgtcggca ctacctacta cttcctcaga tcaacctaca acaacgacag cgtgtggggt 240
aaaaatttca cctgtcttag cgtcacggtg acatcgaaat atgaatcaac gttcaccgtc 300
gaatataaca ccacgtacaa aaatcagagc caacaatggg tcagcatgtc ggaaaacgtc 360
acggccgtgc aggagggcgg ctacagtgtt aaaaacatca ttcagtggac aacggagaat 420
aacacaaagt tcaatgatac tgttgttttt acggacggcc agacttgtga tgtgttatac 480
atcccgtaca aagaagacgg ttacgagctg tgggtgcgtt cggaatacct gcagaacact 540
ccaacgtgct gccagttcat ctttgacctc gtcgcattgg gacgtaccac gtacaatatc 600
tccactccta actgcgtggc caccaccgct ggttagacaa tgcaagccgc ggcttaattt 660
actcgaccgc tcaggttgga agtgccggga gcctcgacgg gcactactac ttaaaatgat 720
ttcgaataaa gtattcaagc atttctggaa aaaaaaaaaa aaaaa 765

<210> 20
<211> 1046
<212> DNA
<213> Boophilus microplus

<400> 20
gatggcgctc agatttgcac ttctgctggc gtgcatcgtc acggcatgtg gctggagaac 60
acggattcaa gagaaaggtc ccgagaacaa ccctctcatg aacacccaac gtttgggaaa 120
aatgcaagac gcatggaaga gtctggaaaa ggcaacaaat cagtcgtatg tcttggtgtt 180
ccgctcaaga aatcacgaac cagagatatc ctgcgtgtac gtgagggcta gtaatataaa 240
taatgacact aaaactgcaa cttataccag aacatattac aatatgacgg caaacgcaac 300
catgacggtg aattatactg caagagctct gaagcaagtg gactatgagt cggaaaatgt 360
cgtacgagta aacctgacag gtggggtccc cagcaacgat acagttcctc ttggaagcta 420
cgaatacgtc gagtacggta attactcctg caatagctca tcgacaccct ttttggatgc 480
tgtgcaaatg gcatcgcaag ggcaatccag agggccggat atcgaagggc gcacatatct 540
agacttctac gtcgtctaca atcaaccatc gtgcaatgtc ctgaagtccc cgctcctggg 600
aggtgcttgt gacttttggg tgacagaatc cgagttgcaa aaagcactaa ataagacatc 660
agagaagaaa aaaacaaagc tagaagcgag agcaaggaaa gctggaggag attccgatga 720
ccagggacct gaactggagg tcgtcttcaa aaatctgccc cctccctgcc gcgcagcgtt 780
cataacttcc tgcggctatc caacttttct tatgtacaac aagaccatct gtaatcgaac 840
ggattctgct gcggtgtgaa cgtcccctgc gagcaagtag aacgtccgtg aagacagcag 900
gaagatagtt gactgttttg ttggcggaat gtgactacta gtctgaatca ttaaaaagat 960
tcngctgacg ggtgtggcgg gaacttttt aaatgaaatt ggtcatactt gttgaaagac 1020
aaaaataaaa caatatgtta ctcctc 1046

<210> 21
<211> 1025
<212> DNA
<213> Boophilus microplus

<400> 21
ggaaaccagg atggcgctca gatttgcact tctgctggcg tgcatcgtca cggcatgtgg 60
ctggagaaca cggattcaag agaaaggtcc cgagaacaac cctctcatga acacccaacg 120
tttgggaaaa atgcaagacg catggaagag tctggaaaag gcagcaaatc agacgtatgt 180
cttggtgttc cgctcaagaa atcacgaacc agatatatcc tgcgtctacg tgagagctag 240
taatttagat aatgcaacta aaactgcaga ttataccaga acatattaca atatgacggc 300
aaaacaaaac gtgtcggtaa attatactgc aagagctctg aagcaagtgg actatgagtc 360
ggaaaatgtc gtacgagtaa acctgacagg tggggtcccc agtaacgata cagttcctcc 420
tggaagcttc gaatacgtcg agtacggtaa ttactcctgc aatagctcat cgacaccctt 480
tttggatgct gtgcaaatgg catcgcaagg gcaatcctgg gggccggatg tcgaagggcg 540
cacatatcta gatttctacg tcgtctacaa tcaaccgtcg tgcaatgtcc tgaagtcccc 600
gctcctggga ggtgcttgtg acttctgggt gccacaatca gagttggaca aggtactaaa 660
caaaaaagga gataagaaaa agccagctaa gtcaagcagt caaaatggag acgaaggttc 720
tgatgccgag caacctgaac tggaggccat ctttaaacat ctacccccctc cctgccgcgc 780

agcgttcata acttcctgcg gctatccaaa ttttctcatg tacaacaaga cgatctgtaa 840
tgcagcgggt catgctgcga actgaacgtc ctctgcgaac gagtagagcg tgcgtaaaaa 900
caactggtct gaatctttta agaaattcgg caaagtgcgg gtggcgcgaa cttttatcaa 960
actggtcata catgtgaaag aaaaaaataa aacaaaatgt gcataaaaaa aaaaaaaaaa 1020
aaaaa 1025

<210> 22
<211> 1156
<212> DNA
<213> Boophilus microplus

<400> 22
cgaagagcag gtacgattcg aatctttgca atggacattc gcagcgctgt tttgttcgcg 60
tgcatcgtct cggcgtgttg tggcttttgg cgctggacaa cacggagggt aactaaaaag 120
cctgataaca gccctctgtt gaacaaccaa catcttggtc ttttccagga cgcatggaag 180
actatagaag agacgtccaa tgatacgtat gtcctgatgt tccgctcaaa acattacgac 240
cacgagaaca aggctaaatg tgtcttcgta acggcaaata ttactgactc ccggaacaaa 300
actgccaatt acacaataac gtattacgat actacaacaa atacatccaa caatttaca 360
atcccagtga gagctctgaa ccaaactgac tactcactag aaaatgtgat tcgagcaagc 420
ttcaacggcg acactccaag ctctactcca gcccctcccg gaagcagcgt gtacattcag 480
tataataatg ttacctgcta cgcccaatat cacccatttt caaataatgg aatcagtgca 540
aaatatgatg aaatgccccg ggatggccga aattacttgt tcgacaattt tattggtgct 600
tacttggact tctacgtggt gttcagccag ccgacatgca acgttctcag agtccgagaa 660
ggatgtgact tctggctaag gaaaactgag ttgccaagcc tactgaaagc agcagaaaat 720
gatgacaacg ataacacgga atcgctgaag aactattggg aaagaagaat aaataatact 780
aaaacaagat ttcgacataa tactaagaaa tgtaagatgt acgtacaacg ttattcaatt 840
gagaaggctg aagatgtctt taaaaacact gcttttaaac acctcccctc cgactgccgc 900
tttgccttcc tggccgcttg tggaaatcca gcattcacaa tatacgaccc agaaacatgt 960
aatagctccc tgccagctaa tatggcagaa agttaaatga gctatttcac ttcatgttcg 1020
accgtatgcc tggtatgcaa gaaggtgagg ttggacagga tacttccgaa ttatttttc 1080
agtctgcctt gtacgcacga aataacaaaa tatctgttga agccnncaac nnnnnnaana 1140
anaaaaaana aaaaaa 1156

<210> 23
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: reverse
trancriptase polymerase primer

<400> 23
aayggngarc aycargaygc ntggaa 26

<210> 24
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: reverse
transcriptase polymerase primer

<400> 24
ktrtmrtcng tnryccanar ytcrta 26

<210> 25
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Tagging sequence

<400> 25
tatatgatca gaaaacccgc tctggg 26

<210> 26
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: tagging sequence

<400> 26
tatactcgag ccagggttcg ccgt 24

<210> 27
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: amplifying oligonucleotide

<400> 27
tatgaagatg caggtagtgc 20

<210> 28
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: amplifying oligonucleotide

<400> 28
atatgatcag ccagggttcg ccgt 24

<210> 29
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: forward primer

<400> 29
tatgagctca tgaactctgc cttgtgg 27

<210> 30
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: reverse primer

<400> 30
tatggatccg gggtggcctc accg 24

<210> 31
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Suggested
octapeptide

<400> 31
Ala Glu Ala Phe Ala Glu Ala Trp
1 5